1. Executive summary

Every country has to recognize the fundamental role of the information and communication technology (ICT) as a catalyst for organizational transformation and change. Therefore, gaining a better understanding of the ICT sector is of a vital importance for the development of the overall economy.

The IT market in Macedonia was estimated to be 37 million USD[1] in 2000, which represents 20% growth rate compared to the previous year. In 2002 the market is estimated to be approximately 50 million Euros. The software market in Macedonia in 2002 was 15 million Euros.[2] The market for system software should be approximately 14%[3], application software 66%[4] and ERP 20%[5].

Based on the data about the size of the home market, it could be concluded that the customer base is quite small. The customisation of software makes for the specificity of the Macedonian market. State-owned and public companies are the most important clients of many IT companies and the money for ICT equipment often comes from international subvention projects. Apart from some exceptions, the Macedonian economy itself does not contribute very much to the development of innovative ICT services. Due to the above stated situation, in the last few years, orders from foreign investors and orientation towards exports are very important. Also, the various international subvention programmes stimulate the demand for ICT products and services in the home market. The companies view that the way forward and the way to accelerate their growth is only through export and their presence in the foreign markets. One of the reasons for a lack of a demand for IT services in the Macedonian companies is the low comprehensiveness about IT of the Macedonian managers.

Macedonia's IT industry strengths could be bestowed to the following factors:

- 10-20% annual growth of the IT market
- Upward trend in the Internet usage and Internet services forecasted to consist 25% of the Macedonian IT market by the end of 2002
- 64% of PCs and 47% of servers sold are assembled in Macedonia
- Favorable regulations for Internet Service Providers (ISP)
- Skilled and educated force

Based on this analyses there are several recommendations that need to be implemented for a sustainable development of the sector and these will be further examined in the second part of the document or the sector strategy.

[1] Information Technology in Macedonia, Macedonian Business Resource Center, 2002

[2] The number is calculated as 36% of the overall IT market which for 2002 was 50 million Euros.

[3] The system software contributed with 5% in the overall market for IT and since the market for software is only 36% of the overall market, it contributes with 14% in the software market

[4] Georgi Milev, Intellicom.com

[5] JNN & Associates Marketing Consultants, 2003

1.1. Introduction

Since the first quarter of 2000, a profound shift has occurred in the field of information and communication technologies (ICT). Share prices of technology companies have fallen to a small fraction of their peaks and the sector had undergone massive consolidation, with many companies falling into insolvency. As the dust settles and the technology bubble dissipates, it is clear that many important lessons can be learned from what has transpired in the sector. Amid the prospect of prolonged deceleration of economic growth, it is more important than ever to understand the contributions of the ICT to economic growth and productivity.

Every country has to recognize the fundamental role of the information and communication technology (ICT) as a catalyst for organizational transformation and change. Therefore, gaining a better understanding of the ICT sector is of a vital importance for the development of the overall economy.

ICT forms the "backbone" of several industries, such as banking, airlines, telecommunications and publishing, and is an important value-adding component of consumer products, such as television sets, cameras, cars, and mobile telephone sets. ICT is today a dominant force in enabling companies to exploit new distribution channels, create new products, and deliver differentiated value-added services to customers. ICT is also an important catalyst for social transformation and national progress. Disparities in the levels of ICT readiness and usage could translate into disparities in levels of productivity and hence could influence a country's rate of economic growth. Understanding and leveraging ICT and developing the sector is critical for nations striving for continued economic progress.

For the ICT to serve as an engine for development, it is absolutely critical that an effective policy framework will enable an economy to fully capture the benefit of the technologies. Setting the "right" environment is difficult, however, for it requires policy coherence among various areas, ranging from labor and educational policies to telecommunications and capital market reforms. In addition, there is no simple blueprint that could be followed - a particular policy mix or strategy that is suitable for one country may not be applicable for another because of any one of a myriad of complex variables, ranging from varying geographic terrain to differing and dynamically evolving economic, political and institutional contexts. The onus is, therefore, on national policymakers and business leaders to tailor and craft their respective policies to create and environment that best suits the development of its ICT sector.

1.2. The IT Industry In Macedonia Today

In 2000, there were a total of 140 registered IT companies in Macedonia. In 2002 that number is estimated to be approximately 200+ companies[6]. Their activities could be classified in the following areas:

- Assembly, sale and maintenance of personal computers

[6] MASIT Catalogue, 2003

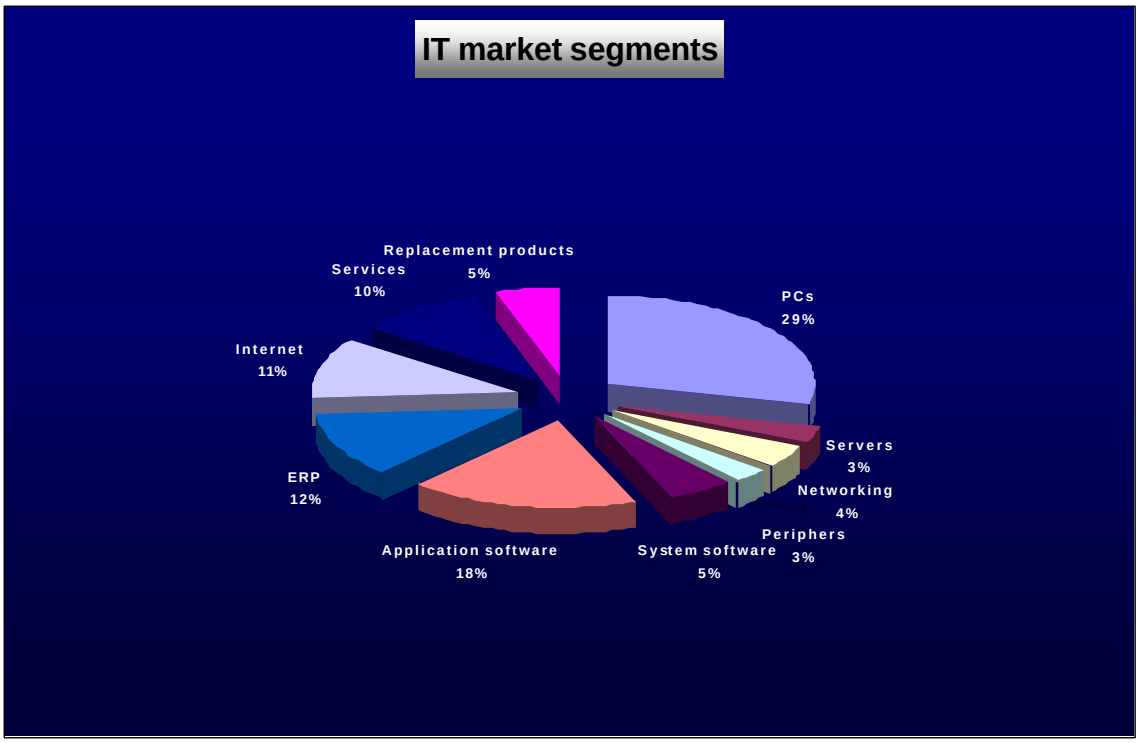
- Sale and maintenance of middle range and high-end computer systems
- Sale of computer peripherals
- Networking
- Cabling
- System integration
- Sale and maintenance of software
- Internet Service Provider (ISP)
- Web design
- Multimedia
- IT consulting
- Training and education

The IT market in Macedonia was estimated to be 37 million USD[7] in 2000, which represents 20% growth rate compared to the previous year. In 2002 the market is estimated to be approximately 50 million Euros. This number is derived from conversations with the largest IT companies in Macedonia regarding their annual sales and their percentage market share in the overall market, as well as the IT spendings of the largest companies in Macedonia (for example, the annual budget for IT investment of Macedonian Telecommunications is between 20-25 million Euros, the government budget is 3 million Euros, the 10 largest companies have a total turnover of approximately 20 million Euros, the two largest banks have annual investments in IT of approximately 1 million Euros each). The IT sector in Macedonia shows steady annual growth of somewhere between 10-15%.[8] On average, the IT market as a whole has an annual growth rate between 10-15% and software and IT services have higher growth. 2001 was a difficult year for the Macedonian economy due to the armed conflict and it is questionable whether there was any growth in the IT sector at all. The average number of employees in the IT companies is between 2-50 employees.

The major market segments and their ratios are as follow:

[7] Information Technology in Macedonia, Macedonian Business Resource Center, 2002

[8] Venko Gligorov, General Manager of Login Systems



Source: Venko Gligorov, General Manager of Login Systems

As it could be seen from the chart above, the largest segment on the Macedonian IT market is the PC sales, with 29% of the market. Realistically this segment is even larger (up to 40%) due to a large number of the Application software sales being tied in with the PC sales. While they are shown as software sales, realistically the sale price is for the PC's, and the software is later pirated. Official data from Microsoft state that only 15% of the software used in Macedonia is legal, while the remaining 85% is pirated[9]. The growth rate of this segment fluctuates and varies by year (i.e. 5% growth in 1999 and 10% growth in 2000)[10]. Internet services represented only 5% in 2000, but were projected to grow with a high annual rate, eventually taking up 11% (or by some accounts 15%)[11] in 2002. In 2000 hardware to software market was 80%-20%.[12] In 2002 expectations were that hardware to software market to be 70%-30%.[13]

Average annual sale of PC's is approximately 15, 000 for the past few years[14]. This is both new PC's and replacement of old PC's. Some sources state the number of 20,000-25,000 PC's per year, but these are best scenario data and vary drastically by the year. The installed computer base is approximately 100,000 pieces[15].

[9] "In Macedonia dominate pirated software copies", Mirce Jovanovski, Utrinski Vesnik, 28 May, 2003
[10] Information Technology in Macedonia, Macedonian Business Resource Center, 2002
[11] JNN & Associates Marketing Consultants, 2003
[12] Information Technology in Macedonia, Macedonian Business Resource Center, 2002
[13] Same
[14] Information Technology in Macedonia, Macedonian Business Resource Center, 2002
[15] World Bank ICT country data

Year	Number of PCs	PC/100 households	PC/1000 per capita
2001	72,000	12.02	34.98
2002	94,000	15.56	45.3
2003E	118,000	20.16	58
2004E	140,000	28	81.3

Source: Statistical office of the Republic of Macedonia

Most of the worlds largest IT companies such as Microsoft, CISCO, IBM, Compaq, Hewlett Packard, Dell, Siemens, Sun Microsystems, Apple, Lotus, ORACLE are present in Macedonia via branch office, distributors, dealers, resellers, solution providers and business partners. In addition, there are number of companies oriented towards assembling, sale and maintenance of their own computer systems.

Personal Computer market in 2000 in RM						
Company	Number of PCs-monthly			Number of servers-monthly		
	Brand name	Assembled in RM	Total	Brand name	Assembled in RM	Total
System Integrators/ Distributors	625	627	1252	72	50	122
End-User companies	90	620	710	17	28	45
Total	715	1247	1962	89	78	167

Personal Computers market Turnover Overview in 2000 in RM						
	Brand name	Assembled in RM	Total	Brand name	Assembled in RM	Total
	PCs			Servers		
Annual PCs	8580	14964	23,544	1068	936	2004
Monthly PCs	715	1247	1962	89	78	167
Percentage	36%	64%	100%	53%	47%	
Average price unit (USD)	1300	800		4000	2500	
Total annual Turnover (USD)	11,154,000	11,971,200	23,125,200	4,272,000	2,340,000	6,612,000
			Grand Total Annual Turnover (USD)			29,737,200
If PCs and servers represent 80% of the market, in that case, the total market would be					37,171,000	

Source: Macedonian Business Resource Center

It is difficult to talk about the development and state of the IT software sector without looking at the basic IT infrastructure (telephone lines, PC's, Internet connections).

The Macedonian telecommunication market volume amounts to about € 600 million: 50 % of the market share belongs to Macedonian Telecommunications (MakTel), which also includes until recently the sole cellular provider, Mobimak[16]. The telecommunication market will undertake many changes in the next two years, since the law for telecommunications permits introduction of competition.

In 2001 the teledensity is approximately 26.7 lines per 100 inhabitants[17]. In 2002 there are a total of 594,213[18] fixed lines including ISDN, which makes the teledensity 29.7 lines per 100 inhabitants. Cellular users are almost 6 per 100 inhabitants[19]. Currently there is only one GSM provider: Mobimak. In February 2001 the government declared its plans to let the second mobile operator into the market. The second mobile operator, Cosmofon, began with work in June 2003. At present there are 366,348 cellular users and they comprise 17.8% of the population[20].

Data from the Bureau of Statistics of Macedonia for 2000 state that the PC penetration was 9.24 PC's per 100 households or 26.93 per 1000 inhabitants or 55,000 PCs in total.[21] In 2002, the computer penetration (number of computers per capita) is estimated to have been 5 computers per 100 inhabitants[22]. The Internet penetration (as number of dial-up subscribers) is approximately 20,000 or 1 per 100 inhabitants[23]. However, the number of Internet users (people who have access to the Internet through somebody else's subscription) is estimated to be approximately 4% of the total population (which is approximately 80,000).[24] There are 200 Internet hosts.[25] There are 15 registered Internet Service Providers (March 2002) with the main market leaders being mt.net.mk (39%), unet.com.mk (15%), mol.com.mk (15%), MKINtern (15%), soros.org.mk, medismk.net, porta.com.mk, euronet.com.mk, on.net.mk (2%)[26]

Voice over IP is considered voice and not data until 2004.

The estimates for the potential size of the market and its growth are as follow:

- IT compromising 1.3-1.5% of the annual GDP (an estimate benchmarking with other European markets).
- Compared with other neighboring countries (e.g. Bulgaria) there is a great potential for the Macedonian IT market to be developed.
- Expectations for the Macedonian market for 2003 on are: 15-20% annual growth rate for the hardware market; 30-40% annual growth rate for the software market and 25-30% annual growth rate for the Internet market.

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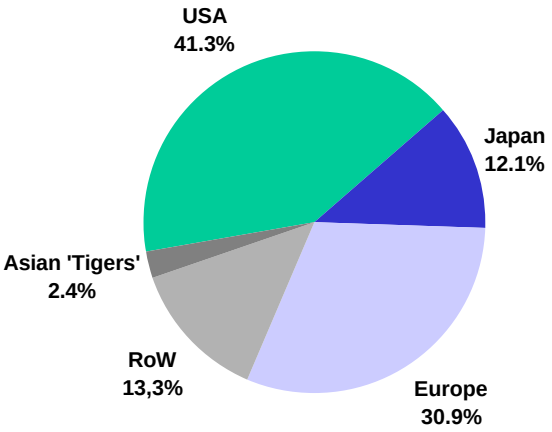
[16] www.mt.com.mk
[17] World Bank data
[18] www.matav.hu
[19] National Report for Republic of Macedonia (Seventh edition), SEED Consortium, T&P Consulting, July 2002
[20] www.mt.com.mk
[21] Statistical Bureau of the republic of Macedonia
[22] Same
[23] Same
[24] World Bank data
[25] National Report for Republic of Macedonia (Seventh edition), SEED Consortium, T&P Consulting, July 2002
[26] National Report for Republic of Macedonia (Seventh edition), SEED Consortium, T&P Consulting, July 2002

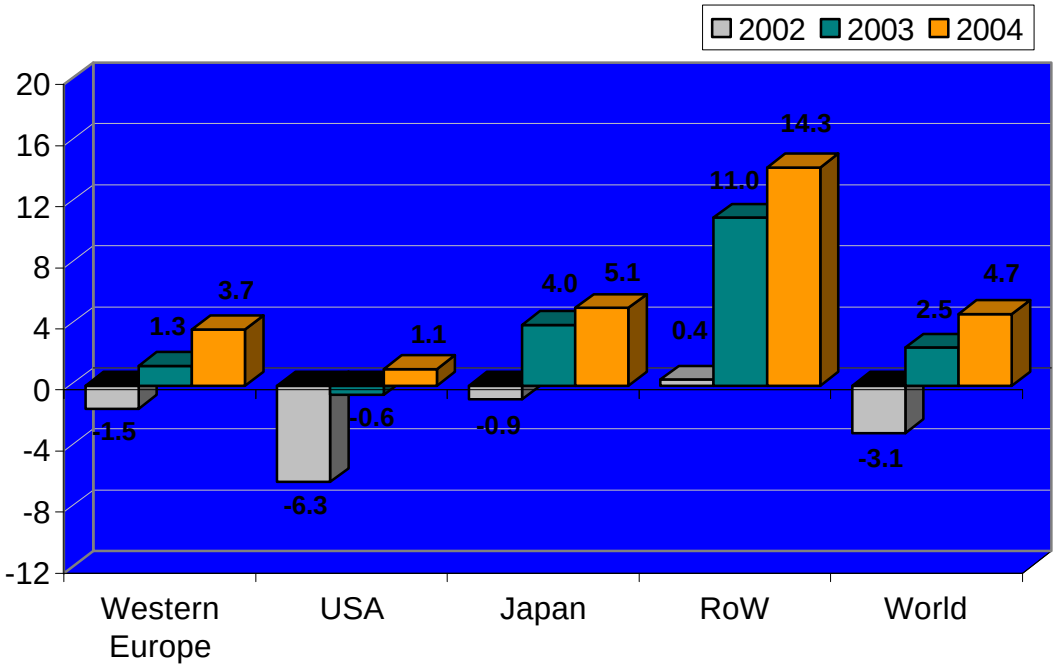
1.3. The IT industry in the world and Western Europe

1.3.1. The IT industry in the world

The total market size of the IT industry in the world is approximately 998 billion Euros[27], with US taking 41.3% of the overall market, followed closely by the European market with 30%.



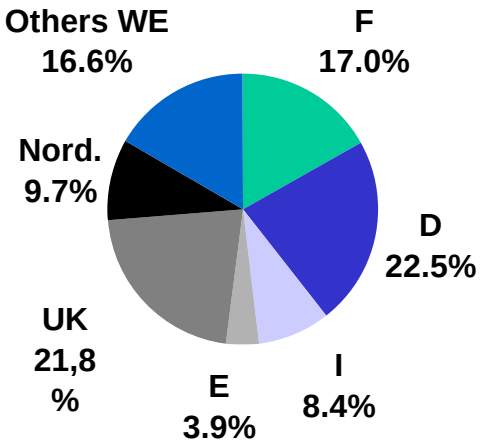
Following are the growth rates for some of the major regions of the world[28]. 2002 was a difficult year for most of the regions, and is a result of the dot.com bubble burst in April 2001.



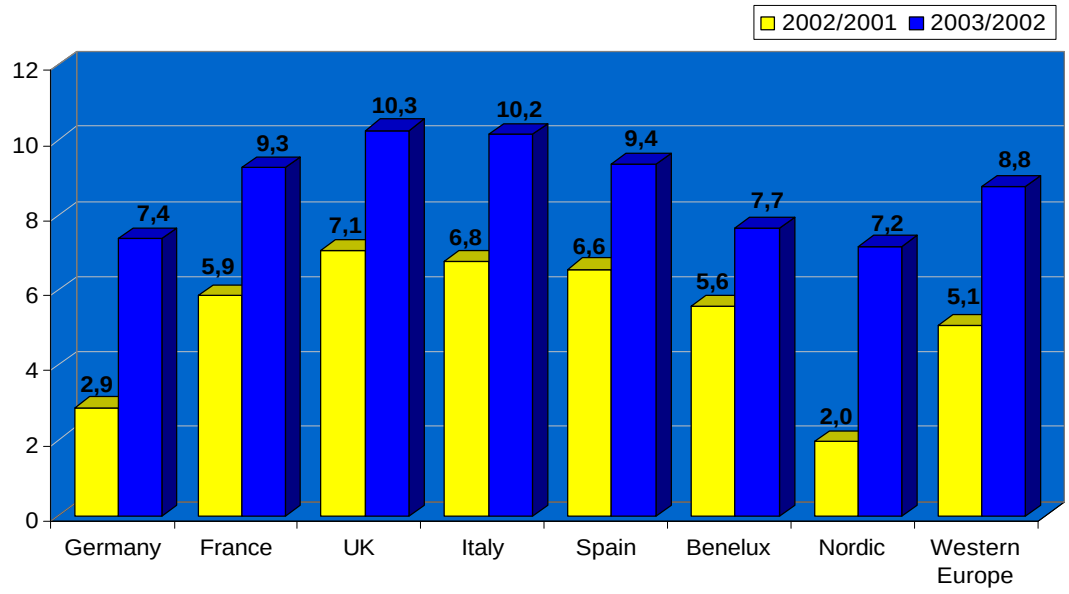
[27] www.eito.com
[28] www.eito.com

1.3.2. Western Europe market for IT

The total market size of the Western European market is 294 billion Euros.[29]

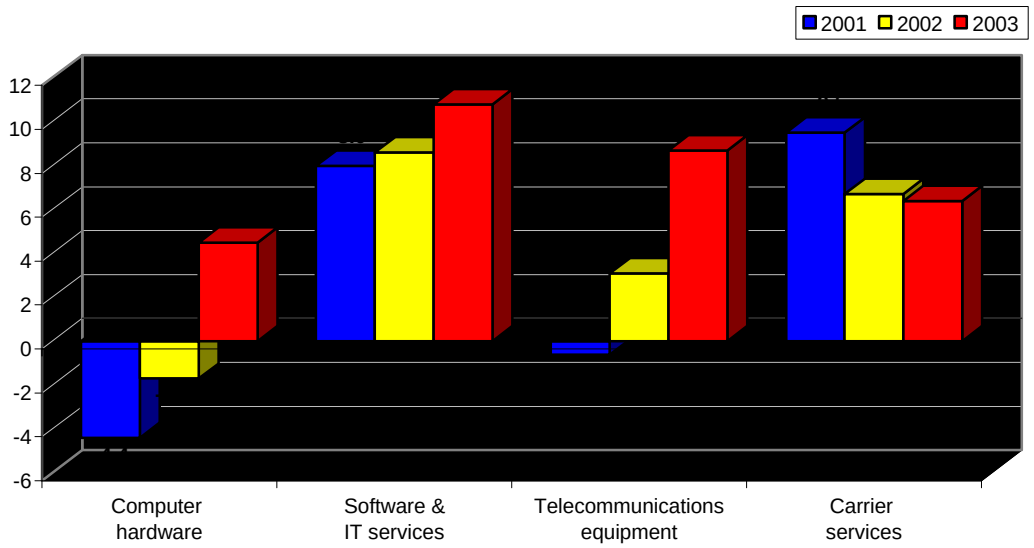


Following are the growth rates for some of the major players on the market.[30]



[29] www.eito.com
[30] www.eito.com

Below are some data about the Western European ICT market actual growth



by segment in % in the period 2001-2003[31]. As it could be noticed the largest growth rates are in the software subsector.

1.4. Economic and Legal Framework in Macedonia

1.4.1. Macroeconomic Performance and the Contribution of the IT Industry

Country background in million USD

Population	2,025,000			
	1999	**2000**	**2001**	**2002**
GDP	3,600,000,000	3,600,000,000	3,400,000,000	
GDP per capita	1778	1778	1679	1805
GDP growth	4.3%	4.50%	-4.50%	0.3%
Inflation	-1.10%	5.80%	5.50%	1.8%
Balance of current account (USD ml.)	-140	-113	-508	
Value added in services (% of GDP)		54.3	58	
Exports of goods and services (% of GDP)		48.3	40.5	
Imports of goods and services (% of GDP)		62.4	55.9	
High-technology exports (% of manufactured goods)			1	0.9
Average monthly salary (USD)	169	155	155	195
Annual unemployment rate	32.50%	32.10%	30.50%	31.9%
Internet users	10,000	50,000	70,000	100,000
PC penetration (per 1,000)		26.93	34.98	45.3
Number of PC's		54,500	72,000	94,000
Mobile phones (per 1,000)		57	60	180
Telephones (per 1,000)		255	267	297

Sources: SECI, National Bank of RM, World Bank data

[31] Same

Basic economic indicators

		1995	1996	1997	1998	1999	2000	2001	2002
Change in real GDP	%	-1.1	1.2	1.4	3.4	4.3	4.5	-4.5*	0.3[1]
Change in real GDP per capita	%	-2.1	0.3	1.3	2.8	3.8	4.1	-4.9*	0.3[1]
Inflation (avg.)	%	15.9	3.0	4.4	0.8	-1.1	5.8	5.5	1.8
Exports (FOB)	US$bn.	1.20	1.15	1.24	1.29	1.19	1.32	1.15*	1.11*
Imports (FOB)	US$bn.	1.43	1.46	1.62	1.81	1.69	2.01	1.68*	1.88*
Trade balance	US$bn.	-0.22	-0.31	-0.39	-0.52	-0.49	-0.69	-0.52*	-0.77*

*Preliminary data
** Imports are on c.i.f. basis.
*** Up to 1997, total foreign debt comprises only medium and long-term credits. Since 1998, according to the new methodology suggested by the WB, total foreign debt comprises short, medium and long-term credits.
1/ Estimation
2/ Payment of long-term credits and loans

Sources: National bank of the Republic of Macedonia, State statistical office of the Republic of Macedonia and Ministry of finance.

The real GDP growth during 2000 exceeded 4%, the highest rate of growth in the country since the start of the transition. While in 2001 the real GDP fell by 4.5% due to the six months conflict inside the country. This had an effect on the development of the IT sector in the country as well.

Another important data is the wage average in the country, as labor cost is one of the most important factors which could determine whether a country has a competitive advantage in the production of software or not (please refer to the section where it talks about the general characteristics of the software development industry). The average monthly salary in Macedonia is USD 169, compared to 149 USD in Bulgaria and 200 USD in Romania[32]. The average salary in Macedonia is lower than its other neighboring countries and closest competitors, Croatia (720 USD) and Slovenia (over USD 1000)[33].

[32] www.databasece.com
[33] Same

Table 2.8: International Comparison of Labour Costs, Labour Productivity and Unit Labour Costs

	labour costs (US-$/hour)	labour productivity (US-$)	unit labour costs (US-$ - basis)
Germany	30,33	39,44	0,77
Switzerland	27,98	41,60	0,67
Great Britain	13,63	22,65	0,60
USA	17,20	31,64	0,54
Italy	17,40	33,18	0,52
Japan	20,44	39,42	0,52
Spain	12,49	26,35	0,47
France	18,85	40,38	0,47
Poland	2,09	5,03	0,42
Taiwan	5,62	13,55	0,41
Portugal	5,20	13,29	0,39
Czech Republic	1,64	5,01	0,33
Singapore	7,32	24,85	0,29
Malaysia	1,53	5,67	0,27
Hongkong	4,82	20,63	0,23
Macedonia	***2,38*** ***	***4,22****	***0,56****

Source: The World Competitiveness Yearbook 99
Labour costs: total payload incl. social security contributions and fringe benefits
Labour productivity: value added per employee per working hour
L*) own calculations.

The contribution of the IT sector in the GDP in 2000 was 1.02%. This percent is derived as a division between the total market for IT in 2000 that was 37 million USD and GDP for 2000 that was 3.6 billion USD. In 2002, there are not official data about the GDP, but if we assume it had stayed the same as in 2001 (3.4 billion USD) and the IT market is approximately 50 million USD, in that case the contribution will be 1.47%. This number is close to the average contribution of the IT sector in the GDP in the other European economies.

1.4.2. Telecommunication law

The Telecommunication law (Official gazette of RM 33/96;17/98 - revised version) regulates the condition and manner of conducting activities in the field of telecommunication, the construction, maintenance and utilization of telecommunication networks and facilities, the relations between the providers and the users of the

telecommunication services, competition in the field of telecommunications, the provision of universal services, the issuing of concessions and performing telecommunication services by concessions, the management, use and control of radio frequency spectrum, the production, import, sale, use and maintenance of radio stations, terminal equipment and other issues related to telecommunications.

For regulating the activities in the field of telecommunications the following institutions are authorized: The Ministry of Transport & Communication and Telecommunication Regulatory Authority - Telecommunication Directorate. The Government of the Republic of Macedonia established the Directorate in November 2000 with the designation of the Director. The Directorate is financed from the fees charged for utilizing the frequencies, supervision and other fees in accordance with its competence. The organization of the Directorate is as follows: The Telecommunication Department, The Department of Radio Communication, The Department of Control and Monitoring of the Radio Frequencies and Department of Finance, Department of Legal Affairs and Department of International Cooperation.

e-Commerce law and regulation

The most important issues that the legal system in Macedonia faces today in terms of regulating e-commerce are:

?? The settlement of the user authentication problem for the electronic transactions over the Internet. The National Parliament has passed the Law for digital signature (http://www.finance.gov.mk/mk/zakoni/zakon_za_elektronski_potpis.pdf)

?? The reforms in the business transactions legal framework have started, so the electronic transactions legal framework will be defined through a project with USID and ICL, which will focus on preparing the legal framework and regulation for e-commerce. The completion of the project was planned after 6 month starting in May 2001. E-commerce set of laws according to EU directives consist of the following activities:

1. Analysis of existing legislation, directives and recommendations of EU, UNCITRAL, WTO, ICC, OECD, etc.
   Prepare commented collection of relevant European and international model laws, recommendations, directives and regulations that Macedonia should consider when drafting new e-commerce legislation. Legislation of comparable countries in the region should be considered in this analysis.
2. Analysis of existing legislation in Macedonia
   Analyzing the Macedonian legal system for any and all obstacles regarding e - commerce and legislation identified which needs changes to stimulate e-commerce. Those obstacles could either be specific legal provisions tailored for paper - based commerce or provisions missing in Macedonian legislation and which are needed where e-commerce practical applications also change the procedures or ways government or commerce operate.
3. Propose possible solutions from incompatibility of existing legislation
   Based on the analysis of existing legislation in Macedonia different ways of introducing changes will be suggested for problems outlined in the analysis. Upon this proposal the Macedonian government will be able to decide on which route to follow to solve the outlined problems**.**
4. Proposal, draft and final version of necessary changes in the legislation for e-trade, e-services and consumer protection

Selected solutions in some cases may need new or amending legislation. Therefore the following provisions will be needed:

a) Provisions regarding exchange of electronic of electronic messages and on - line delivery of intangibles;
b) Obligations and liability of Internet Service Providers, application service and content providers;
c) Provisions considering the disclosure of pertinent data for business transactions;
d) General and e-commerce specific consumer and personal data protection provisions;
e) International private law solutions incorporated in the new draft-Hague convention

?? Proposal, draft and final version of necessary changes in the legislation for e-banking

Selected solutions from the proposal will in most cases need new or amended legislation. In this field the following provisions will be needed:

The obligation and liability of banking institutions in e-banking security needed in financial transaction provisions regarding the issuance of e-cash

?? Proposal, draft and final version of needed changes in the legislation for transport and customs (especially connected with the transportation documents)

The legislation should replace both the requirement for a written contract of carriage and the requirements for endorsement and transfer of possession of a Bill of Lading

?? Proposal, draft and final version of necessary changes in the legislation for special areas like Health Care, Lawyers, Notaries etc

?? Proposal, draft and final version of necessary changes in the legislation for e-archiving

1.4.3. Intellectual and industrial property protection rights

The Constitution of the Republic of Macedonia guarantees the rights, which derive from the scientific, artistic, and other types of intellectual activity.

Since 1993, Macedonia has been a member of the World Intellectual Property Organization (WPIO), accepting thus all its conventions and agreements.

Since 1997, the Republic of Macedonia has become a member of the Committee of the Paris Union and a member of the Coordination committee of the World Organization of intellectual property.

The Law on Industrial Property Law from 1993 regulates the acquisition and protection of the industrial property rights (patent, model and sample, design trademark, and service mark and appellation of origin).

The Office for protection of Industrial Property of the Republic of Macedonia administers the administrative procedure and other administrative affairs regarding acquisition and protection of the rights for industrial ownership. Protection of inventions, new shapes, pictures and drawings, trademarks and service marks shall be requested by a submission of an application to the Office.

The Office can also accept application requesting protections of inventions, new shapes, pictures and drawings, trade marks and service marks abroad, if they comply with the

international agreements and conventions to which the Republic of Macedonia have been admitted.

Foreign legal person and foreign citizen enjoy the same rights as the domestic legal person regarding protection of industrial property in the Republic of Macedonia if it is in compliance with the international agreements and the conventions or the principle of the reciprocity.

1.5. Macedonian Institutional Framework Supporting the IT Industry

1.5.1. Presidential initiative "e-Macedonia for all"

The President of the Republic of Macedonia Mr. Boris Trajkovski has launched an initiative called "e-Macedonia for all". The objective of the Presidential initiative "E-Macedonia for all" is to accelerate the activities in Macedonia's transition towards an Information society and networked economy. The Presidential committee "E- Macedonia for all" was established and consists of experts at high executive positions in the area of education, telecommunication operations, governmental institutions, banking etc., who can use their influence to help this process become a top priority in the society.

1.5.2. KIT

The Committee for Information Technology was formed in December 2002 through a resolution of the Government of the Republic of Macedonia. The main task of the Committee is to prepare an analysis of all activities in the area of ICT in the Republic of Macedonia, coordinate all on-going activities aimed at the development of the ICT, prepare a proposal for a national strategy for the ICT sector with recommendations to the government, educational institutions, players in the economy, scientific, health and cultural institutions with the goal of bringing Macedonia closer to the eEurope+ initiative and the main assertion of: contemporary public services, dynamic e-business environment, access to a wide network of competitive prices and infrastructure for the safety of data. The Committee has drafted an action program for the period 2003-2007 and is working with the various government ministries on gathering data about the sector.

1.5.3. E-government

Electronic Government (e-Government) is an emerging force today, all over the world. Politicians and administrators have to realize that the e-Government framework is much more than establishing a website and performing transactions via the Internet.

The required process standardization and reengineering, together with the organizational redesign that are prerequisites for moving towards e-Government direction, will surely affect how the way Public Administration is organized and functions. Moreover, in the emergence of the Information Society, the mission statement, the goals and the legitimacy of the State may be arising once again.

In light of these changes, the Ministry of Finance of Republic of Macedonia has started a portal named FORUM with various possibilities for discussions, suggestions about Draft Laws or initiatives.

An interesting initiative for business to public sector electronic commerce has been the one taken by the Ministry of Finance. Specifically, the Macedonian taxpayers have the possibility to download and inform themselves about laws and procedures about VAT obligations and other laws through www.finance.gov.mk. Possibilities for e - commerce in banking and trade are still on basic level. During July 2001, a serial of training for e banking and trade sponsored by European Center for Peace and Development of the UN University for Peace ECPD Regional Institute for Development Studies were organized. Some activities in local self-government are being made. The famous one is www.skopje.gov.mk an official portal of the capital Skopje with e-services included.

1.5.4. Electronic payment

During 2002 about 60.000 Cash Registers with POS and linked with Public Revenue Agency should have been introduced (with telephone line). In 2002, the National Credit Card for Payment was supposed to start to function and 100.000 cards were supposed to be issued to employees in the public sector. It should have been the beginning of the implementation of the law for digital signature, digital cash and electronic protection of personal data. However, the project is stalled at the moment. More information could be found on www.npk.com.mk.

Credit cards are becoming a popular way for payment. The most popular ones are Diners, VISA, MasterCard, and American Express. The estimated number of issued credit cards in Macedonia is approximately 120,000[34].

1.5.5. Chamber of Commerce

The Information center of the Economic Chamber of Macedonia was established in 1992. According to the concept of development and functioning of the Information system, the main emphasis has been placed on linking with foreign data banks, opening of the Chamber Information system base towards foreign basal services, that is, making the base a constituent part of world data banks. The Information system avails with its own WWW server of Internet, with information on Macedonia and the Macedonian economy, at the following address: www.mchamber.org.mk .

1.5.6. City of Skopje

The City of Skopje in 2002 started participation in two projects funded by EU close to e-government objectives. The first one is named e-MunIS-Electronic Municipal Information Services - Best Practice Transfer and Improvement and second one is "e- City Council" with main objective "Transparency and citizen involvement in Council sessions and cancellers working". The e-MunIS project had its first stage results that may be found on www.emunis-ist.org .

The Bureau for Information systems of the City of Skopje is responsible for the modernization of the city administration and the development of the IT in the city of

[34] Data from Komercijalna banka, International Private Bank, Stopanska banka, Tutunska banka

Skopje. Some of the activities of the Bureau are: developing a strategy for the development of Information systems, project design and implementation of IT projects, IT training of staff, implementation of ISO9000 standards.

1.5.7. MASIT

The Macedonian ICT industry needs a strong lobby association, which can support companies in promoting their sector and international marketing (among other services). The „Macedonian Association of Information Technology" (MASIT) was set up in 2001 and its goal is to manage these tasks. Important expectations from MASIT are the support of activities towards the promotion of member companies abroad.

Currently 35 companies are members in MASIT and about further 12 companies did express interest to become members. MASIT members represent about 95 % of the market volume. The MASIT management board mostly consists of companies that have been working for 10 years in the market. MASIT in April 2003 elected a new presiding committee. The committee should be reduced from 15 to a reasonable size of 6-8 members. In the last few months the association has hired a professional Secretary General to take over the role of managing the activities of the association. Also, within the different committees of the association, various strategies for the development of the association and the different sub-sectors are being worked on.

One of the main activities and a success story was the leadership role that MASIT took in the organization of the SEEITA Conference - the first Conference of IT Associations of South-eastern Europe in Ohrid, Macedonia from 31/10/2002-3/11/2002.

Credit to MASIT, Macedonian ICT companies intensified their communication with each other. In the past, companies often did not even know each other and were not able to communicate common interests. Since the creation of MASIT, IT companies have a venue through which they can talk to each other, learn about their mutual strengths and propose joint projects for big calls for tenders.

Projects from various organizations support the development of the association. GTZ-PSP, for example, offers training and individual consulting for association policy, organization structure, member policy, range of services, financing concepts etc.

The most important tasks of MASIT consist in promoting international contacts for Macedonian companies and helping the government develop a strategy for the promotion of ICT. Furthermore, MASIT offers a permanent communication platform.

From 2002 MASIT planned to concentrate on the following tasks:

- ?? Establishing contacts with associations in neighbouring countries and in the EU
- ?? Developing regional networks to support technology transfer / exchange of experiences
- ?? Including Macedonian companies into large networks to initialize international business
- ?? Communicating examples of successful international cooperation
- ?? Organizing the communication between Macedonian ICT companies
- ?? Organizing holdings for big calls for tenders

?? Controlling the award of state orders (control of competition)

?? Intensifying relations with the government

?? Lobbying aimed at:

- Improving political conditions for the ICT industry
- Orientating the education system to challenges of ICT
- Creating an appropriate legal framework for e-economy

?? Introducing European standards in ICT sector

?? Informing government and users about the digital economy

?? Driving forward the initiative e-Macedonia of the President of the Republic of Macedonia

?? Extending the association's membership to telecommunications

So far, MASIT has established contacts with the Ministry of Bavaria, Go to Bavaria and the Fair in Munich, as well as BAIT and BITKOM.

1.5.8. VIP 2002

Login Systems and the working group "VIP 2002" during March 2002 organized a Conference named as "e-government and e-business in Macedonia". The main result of this conference was the offered e-Declaration 2002 - Recommendations for rapid development of an information society and digital economy in the Republic of Macedonia as a national priority.

The working Group "VIP 2000" continued its work by preparing an Action plan for the realization of the e- declaration, which was discussed and recommended by the Macedonian Government. President Boris Trajkovski gave his consent for the e-declaration and the action plan and it was adopted by Parliament.

1.5.9. GTZ-PSP

The Deutsche Gesellschaft für Technische Zusammenarbeit GmbH (GTZ) is a government-owned corporation for international cooperation with worldwide operations. In more than 130 partner countries, GTZ supports ca. 2,700 development projects and programmes, chiefly under commissions from the German Federal Government. Aim of GTZ is to improve the living conditions and perspectives of people in developing and transition countries.

GTZ-PSP (Private Sector Development) in Macedonia has been working with the IT sector in Macedonia in several areas, most notably with the MASIT. Here are some of the activities they supported.

1) Systems - Within the framework of the cooperation between the Macedonian Association for Information Technology (MASIT) and the GTZ-PSP project, the visit of a delegation of IT businessmen to SYSTEMS 2002 was sponsored by GTZ-PSP, with several objectives in mind:

- To give selected Macedonian companies with export or subcontracting potential an opportunity to:

a) Evaluate Systems in Munich for possible future participation as exhibitors,

b) To enter into business discussion with potential business partners about outsourcing in the field of software development

- Through the process of preparation for and visit to the event to strengthen MASIT and to contribute to the organization of processes and communication between the member companies
- To assist MASIT in institutional networking with similar organizations and other relevant institutions in Germany.

The visit of the delegation took place in the period of 13th to 16th of October 2002, effectively two full workdays.

2) SEEITA - GTZ-PSP gave support organizing of SEEITA. The assistance included organization and preparation of the materials for the conference, establishing cooperation with the German IT association BITKOM, and setting up a presentation of German consultants who was also an attendee of the conference. The conference was done in cooperation with MASIT, GTZ TT - Technology Transfer Project and Macedonian Business Resource Center (MBRC).

3) CeBIT

CeBIT is the most widely known ICT trade fair world-wide, covering the entire spectrum of information technology, telecommunications, software and services. It serves as the leading event for this major sector with 6,500 exhibitors from more than 60 countries and some 700,000 visitors from across the globe. Six Macedonian IT companies exhibited at the CeBIT 2002 Fair for the first time where they established valuable contact and negotiated potential contracts.

1.5.10. GTZ-Technology Transfer

One of the technology transfer activities and initiatives in Republic of Macedonia is the GTZ-Technology Transfer project, which helps the capacity building of the technical faculties in Skopje and Bitola through technology transfer's organization and implementation.

The development of the technology transfer centers will be based on Public Private Partnership base. During June 2002, the first Technology Transfer centers were to be organized. More information for these projects is available on http://www.gtztechno.com.mk .

1.5.11. SIPPO

SIPPO, the Swiss Import Promotion Program, supports small and medium-sized enterprises in emerging markets and markets in transition in their export endeavors and their market entry into Switzerland and the European Union. SIPPO operates under the patronage of Seco, the State Secretariat for Economic Affairs.

Within SIPPO's project *Software*, in February 2003 SIPPO organized an Information and Selling Mission - Macedonian Software at iEX iNTERNET EXPO in Zurich. iEX iNTERNET EXPO is nationally oriented trade show with 440 exhibitors, mainly Swiss companies.

Six export oriented producers of software applications and suppliers of software developing services from Macedonia participated in this project.

SIPPO aimed at achieving two main goals through the organization of this event:

1. Delivery of market information to the invited Macedonian companies regarding the market situation in the Swiss IT sector; useful tips concerning establishing business contacts with Swiss exhibitors at the trade fair, as well as about SIMSA, Swiss Interactive Media and Software Association and exchange of experience and contacts with a representative of this Association - Mr. Walter Duss, Vice President of SIMSA.

2. Use the opportunity to meet some Swiss potential business partners during Internet Expo, Zurich, visit them at their exhibitor stands and discuss business possibilities.

1.5.12. UNDP

The UNDP in cooperation with the local municipalities has developed a strategy for the development of the ICT on a local level.

1.5.13. Mt Net

The low percentage of usage of PCs is one big barrier in using Internet and to the development of e-commerce environment in Macedonia. Some initiatives that are implemented and are aimed at increasing the number of PC among the population were for example the MT NET Initiative for selling by leasing PC + Internet http://pcinternet.mt.net.mk/ .

1.6. Education

In regards to IT related education, following are some data: 150,000 students in elementary school could have the subject of information technology as an elective course, 93,000 students in high schools have IT as an obligatory subject, 40,000 students take introduction into informatics at the beginning of college education.

The contribution of the scientific sector in the development of electronic commerce in the last few years is considered particularly positive.

There is an important research group on electronic commerce that covers all research issues, from security to new business models at the Faculty of Economy. However, there is not a post-graduate course specialized in electronic commerce.

The degree courses on electronic engineering and new technologies are covered by the Faculty of Electronic Engineering - Department for Computer Science with about 100 students admitted annually and the Faculty of Natural Science and Mathematics, Institute for Informatics, with 50 students admitted annually.

At the state owned University Sts. Cyril and Methodius there is a network and Internet network with 1 Mbps Internet connection. The network was set up 3 years ago. The intra communication is very good and some faculties are re-building their WEB pages, Portals and started with e - education. Under the UNESCO umbrella a project started for scientific cooperation in SEE countries. The framework of this project proposes reconstruction of the network to a 622 Mbps - 2 GB speed.

The University has built very good professional connections and links with other universities in SEE countries such as Bulgarian, Turkish, Yugoslavian, Romanian and Greek Universities.

At the end of 2001 the contract for technological development was signed. The members of that contract are the Faculty for Mathematics and Natural Science, Institute for Informatics, Makedonski Telekomunikacii, GTZ, New Phone - Greece and Ericsson enterprise. The objective of this contract is implementing the High Technological Transfer Center. This kind of contract will integrate education, infrastructure and companies in providing opportunities for research, design and engagement of young engineers. The Center will start with WAP common developed applications. The premium realization of WAP public application is in the A1 Television Station.

2. Special reference: Software development Industry

2.1. General characteristics about the software industry

The next section gives an overview of the main characteristics of the software industry. The intent is to provide better understanding into the factors that determine where value is created in the industry and what drives success in the sector.

2.1.1. Revenue stream

The revenue streams in the industry are generated from one of the following three sources:

- Original purchase or licensing of the software
- Maintenance of the software sold or licensed by continually improving it by adding features or solving any discovered bugs; customers usually purchase maintenance contracts that cover the life of the software;
- Service and support as customers need assistance in handling the complexity of the software, installation, etc. Training and customization is also a great deal of this source of revenue. These services are purchased on a consulting basis and can often be highly profitable due to the high margins it generates.

2.1.2. Value Chain - The business process

2.1.2.1. Research and development

This is where the ideas and the concepts for a product are generated. The prospects of success are investigated (market needs, projected demand, etc.) R&D costs average between 10-20% of sales according to a survey of some software companies.

2.1.2.2. Product development

Based on the product market study and customer needs the product is developed and tested. In many instances, modules of the software could be outsourced to developers in other smaller companies, or to branches in different parts of the globe. Outsourcing would be restored to as a method of resource management and to cut costs of development.

2.1.2.3. Business development

For companies that cater to other businesses prospective clients that would use their software have to be sought out. Finding business partners and satisfying their needs and requirements is crucial here. Products in this area would be enterprise software in general with all its different categories. The importance of this area increases as B2B commerce grows and as companies move towards mobile and virtual work environments.

2.1.2.4. Sales and marketing

For companies that focus on mass production of their software applications, sales and marketing strategies have to be designed to better reach customers. Due to the importance of brand names in this business, branding of the products becomes very important.

2.1.2.5. Customer Service and Maintenance

The products produced have to function properly with no difficulties for the customer. Hence the importance of this function comes in solving customer problems as quickly and efficiently as possible. This is one of the streams of revenue in the software industry as discussed above.

2.1.3. Software pricing

The pricing of the developed software depends on the market. It is absolutely demand driven. Typically software prices are high at the beginning, and then they decrease in price, unless the issuing company continues to upgrade it with new versions. The demand for software mostly depends on PC penetration in the market.

2.1.4. Demand Drivers

- The penetration of PCs in the market
- The quest of many companies to integrate their information systems and create enterprise systems
- The growth of the Internet and prosperity of e-commerce has prompted many companies to capitalize on that by restoring to the web to conduct different transactions and business processes
- The development in the field of multimedia and the decrease of costs in that area, lead to the capitalization on virtual groups, video-conferencing, etc. that reduce corporate expenses.

2.1.5. Entry barriers

The industry is capital intensive at the starting up stage, and most often requires a general know-how provided by a Western organization. The industry is much in demand, since it has dramatic development impact. In spite of its diversity, the software and IT industry has similar cost and revenue structures throughout the entire activity spectrum. The business is generally a high margin cash generator once sales have picked up. A simple business model will have to be based on the three main elements:

- Sales volume, or market penetration
- Sales prices practiced by the software or service company
- Local currency value versus international currencies and its evolution in time

2.1.6. Key risk factors

Brand name - Branding a product is an important factor in the software industry. Companies that have established themselves as brands in the market would sell their products better than its competitors. Hence an investigation into the branding policies of the company and its market position would give an indication to how well its products would fit in the market.

Development expenses for the first version - A significant amount is spent on the development of the first version of software. This expense is not limited to development only, but also to marketing, and technical support of the infrastructure needed for this first version. Subsequent products based on this version are then cheaper to develop, since the technical infrastructure is already in place.

Labor issues - Labor is usually the largest expense in the software industry, once the company has completed its start up. Software development might require a team of at least six or even more per software module. The salary ranges for these developers and programmers would depend on the local market in which they work. The salaries of software developers and programmers in developing countries are fraction of those in North America and Western Europe.

Countries	**Salary fraction**
Hungary	20%
Turkey	10%
Mexico	10%
Russia	10%
India	5%
China	5%

These low labor costs create a competitive advantage for developing countries in this are that is greatly labor intensive. This results in many companies in North American and Western Europe to subcontract their software development projects to other companies in developing countries.

Employee turnover in software companies is an issue of concern. On average turnover is about 5%, but that varies according to the culture of the country, employee loyalty and market situation.

Life cycle - In developing software, the process is usually lengthy and time consuming. As described in the development process above, there are many checks and verifications that the product has to pass before it could be released to the consumer. This is amid a world where the rate of innovation is quite fast and product cycle times are short. The timely development of the software would require a substantial investment in high skilled labor in addition to planning and management.

Intellectual property rights - This is one of the major issues in the industry. Software piracy costs the industry an estimated $11 billion in sales losses in the United States. Although many countries have improved their Intellectual Property Rights (IPR) practices, yet the problem is still prevalent and critical.

Development and advances in multimedia, e-commerce - The fast pace of development in the areas of multimedia and e-commerce drive the growth of the software industry. These areas are in constant need of new and updated software for the various functions they need to accommodate. Hence they are only a source of growth but also a challenge for the industry.

Dependence on the OS - Software is usually designed to run on a certain operating system. This would require the OS vendor to make available pieces of the operating

systems code. As a result OS vendors are put in a position that commands power and raises anti-trust issues as in the case of Microsoft.

Revenue streams- It is important to investigate the source of the revenue streams. If a vendor's software revenue is mainly maintenance and support based, then questions should be raised about the future demand for the core products of the firm.

2.1.7. Success factors

Quality of the product - The production of a quality product that is backed up by a proper support and maintenance infrastructure would play a major role in the success in the industry.
Familiarity and Compatibility - The production of software that has a familiar interface and is compatible with other software and the operating system is use is the leading factor in software success. Incompatible software acts as impedance to productivity improvements.
Functionality - The cost of installing and using new software leads customers to build on what they already have rather than acquire new software. Hence to break in a large comparative advantage has to be proven for a system to encourage its purchase and installation.
Network effects - The more users use the software the more attractive it is to other potential users. This places a lot of importance and emphasis on the necessity of getting positive feedback, as negative feedback can drive the new product to extinction.

2.2. General Industry Information about the global market of software

The software industry has reached at least $200 billion sales volumes worldwide (beginning of 2000), and is growing at an estimated 10-15% yearly rate[35]. Currently, it is one of the most profitable, changing and most strategic industries. It includes a large number of segments, each significantly different from the others in size, content and structure. The product designs are greatly influenced by the end user's needs. New types of products are constantly emerging, and even new types of customers.

2.2.1. Sub-Sectors

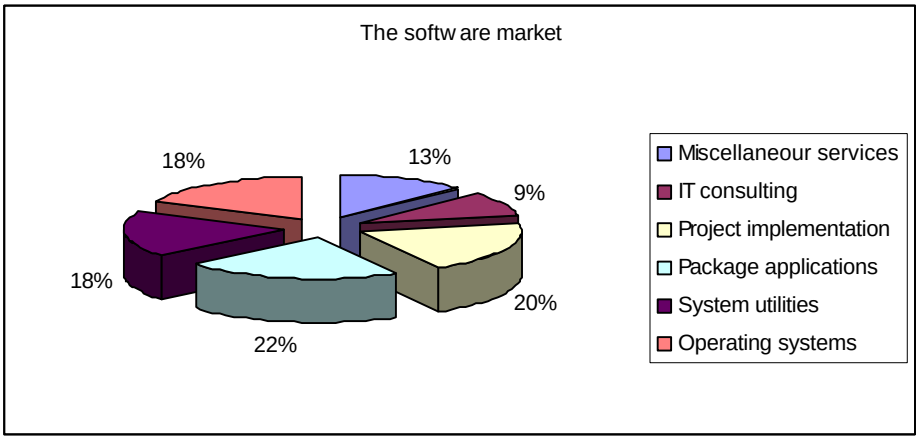
Packaged software

- Operating systems ($35billion)[36], which are the interfaces between the computers and the users
- System utilities ($35 billion)[37], which manages proprietary equipment's functioning. This category is also called Application Hosting Industry.
- Package applications ($45billion)[38] or data processing. These are the most "classical" of the software, are the category generally known by the consumers

[35] www.eito.com
[36] IFC data
[37] IFC data
[38] IFC data

Services

- Project implementation ($42billion)[39], aimed at building technical and business solutions for data processing. It includes project management ($20 billion) and Custom software development ($22billion)[40]
- IT consulting ($17billion)[41], which include a wide range of service for information systems (IT) deciders: strategy, design, analysis, diagnostics, and assessments.
- Miscellaneous service ($26billion)[42] such as training, distance learning, and maintenance, often through Internet.



Source: IFC data

2.3. Information and Data about the software market in Macedonia

The software market in Macedonia in 2002 was 15 million Euros.[43] There is not an official data about the distribution of the software market segments, but if we take the number about the contribution to the overall IT market, in that case, the market for system software should be approximately 14%[44], application software 66%[45] and ERP 20%[46].

2.4. Performance of the software Industry in Republic of Macedonia

The software development within the Information and Communication technologies (ICT) sub-sector contributes as a dynamic and highly innovative branch to strengthening the national competitiveness. Due to the unmistakable dependence on many industries to

[39] IFC data
[40] IFC data
[41] IFC data
[42] IFC data
[43] The number is calculated as 36% of the overall IT market which for 2002 was 50 million Euros.
[44] The system software contributed with 5% in the overall market for IT and since the market for software is only 36% of the overall market, it contributes with 14% in the software market
[45] Georgi Milev, intellicom.com
[46] JNN & Associates Marketing Consultants, 2003.

software it increases their performance and competitiveness through supplying them with advanced and forward-looking solutions.

Based on the data about the size of the home market, it could be concluded that the customer base is quite small. It is often that companies develop application software to be implemented in a restricted number of client companies only – so there are more personalized solutions than standardized products that could find a further customer base on the market. Since there are not many large projects, the growth possibilities of the IT companies are limited. Whereas some clients still use old systems (even old Digital VAX), there are an increasing number of client companies using new systems. Therefore, suppliers of IT solutions have to be able to adapt themselves to each kind of infrastructure in client companies. The customisation of software makes for the specificity of the Macedonian market. These particularities of the Macedonian market protect suppliers for a while from international competitors, but also prevent them from adapting rapidly to international markets. However, the local companies are forced to work this way because of the small customer base and the small number of clients that demand software products. In addition, the limited customer base poses a risk that insolvent companies put ICT suppliers into liquidity crisis.

Public and governmental organizations are still the most important clients of many companies. However, the demand of private companies and end-users is also growing constantly. In recent years the orders from foreign investors are very important. Also the various international cooperation programs stimulate the demand for IT products and services in the home market. Innovation oriented domestic companies are increasingly concentrating on foreign markets.

Apart from some exceptions, the Macedonian economy itself does not contribute very much to the development of innovative ICT services. For example the market for web hosting is progressing slowly. Up until recently companies were not used to paying for consulting services and the culture of outsourcing is not very widespread. Innovation oriented companies completely concentrate on the foreign markets. A certain trend in the market development in Macedonia can clearly be recognized: business applications and Internet are more and more combined to complete e-business solutions.

Due to the above stated situation, in the last few years, orders from foreign investors and orientation towards exports are very important. Also, the various international subvention programmes stimulate the demand for ICT products and services in the home market.

A new tendency has emerged in Macedonia for the past 2 years: international subvention organizations and foreign owners of Macedonian companies influence the state and private companies in terms of the software that is being bought. Foreign companies want their subsidiaries in Macedonia to use uniform software as their other offices – they want to use the same applications everywhere. This poses a problem for the local companies because it decreases the already small customer base and stiffens innovation. Therefore, Macedonian ICT suppliers have to quickly adapt themselves to these new competition conditions and to develop software products that meet all international requirements.

Currently the most important market for consulting services in Macedonia consists in the subvention programs of foreign organizations. However, there is not a well-established cooperation between the management consulting and IT services consulting. Typically,

when management consulting companies do not have an IT component, and when the issues are IT related, the lack of cooperation and communication between the two consulting branches does not contribute to increase the IT solutions demand.

Macedonia participates in European programs like e-Europe (programme e-SEEurope for South East Europe within the stability pact), which create greater demand for IT systems and services.

Cooperation between Macedonian companies is absolutely necessary to carry out big foreign projects. Macedonian companies have now begun to develop a cooperation culture, mainly through the activities of MASIT. Whereas before companies would work together to carry out big projects that show an extensive software part, now the cooperation goes a step further. Through MASIT the companies that would be direct competitors on the market, have found a forum where they could share their problems and through these discussions have developed trust. In the opinion of the interviewed companies, there is still a long way to go, but it was everybody's opinion that it is moving in the right direction.

Not all IT companies have tried to contact potential foreign customers. Until now, the priority has consisted in setting up companies and winning local customers. Now companies are intensively looking for ways to acquire foreign customers. They have limited experience in this field.

Currently a core point of cooperation between Macedonian companies and Western partners has been distribution and service for imported products. Further examples of cooperation with Western European companies come in the field of human resources. This cooperation involves setting up development centres, and opening up subsidiaries. This is a good sign that the level of education and knowledge of the Macedonian information scientists is on a satisfactory level.

Apart from a few exceptions, international companies currently contract Macedonian ICT companies only as partners for little, unique projects, and not for a solid, strategic cooperation. The year 2001, difficult for the whole international ICT market, also influenced the cooperation between Macedonian and Western European ICT companies. Many Western partners went through a crisis and had to cut back or even to cancel cooperation projects.

Until now we only know of a few examples of cooperation in the field of research and development of products and technology. International assistance programmes and European R&D-programmes did initiate the few existent projects.

Currently Macedonian companies initiate partnerships that extend to the whole region, especially to the neighbouring countries, for example to Yugoslavia where the market is growing rapidly. These are natural markets to penetrate, first because they used to be part of one market and a lot of the Macedonian companies know the markets, but also because of the language and proximity.

The companies view that the way forward and the way to accelerate their growth is only through export and their presence in the foreign markets. They view the European market as a logical way to start to penetrate. Some of the companies that have had cooperation with foreign companies have expressed caveats about conquering the

foreign market. In their view, there are several obstacles connected with that. First, a lot of the foreign markets are very closed and it is very difficult to penetrate them. Second, there is not brand or country recognition when a Macedonian company wants to export its products. Third, due to a limited international contracts experience, a lot of the Macedonian companies do not have good references. Therefore, the ones that have established a fruitful cooperation with a foreign partner, that knows the local market and is well established, have been able to make a presence on the foreign markets. How they could compete?

One of the reasons for a lack of a demand for IT services in the Macedonian companies is the low level of IT literacy of Macedonian managers. A lot of the companies have problems selling their products to the management and when the company decides to buy it, it is usually with some reluctance as to its benefits. It needs to be mentioned that the level of managers' sophistication in terms of IT differs for the different industries (banking and some large industries has traditionally had a higher level of competence). It is interesting to state that the level of computerization and IT incorporation into the company has decrease since the early 1990's. A lot of the large production systems have disintegrated, and in the economic crisis that followed, IT investments were viewed as an expense. The creation of new SME's did not contribute to the increase of IT demands in the companies.

Since the government presents one of the largest "clients" for the IT companies, the companies viewed the drastic decrease in the budgetary expenditure negatively. The opinion of every single company was that 3 million Euros expenditure for IT in the 2003 budget is not sufficient for a country that states that IT is one of its priority sectors. This compares to number of approximately 30 million Euros in Croatia and 200 million Euros in Yugoslavia.

2.4.1. Analysis

2.4.1.1. SWOT Analysis

The information from interviews with companies and organizations has been evaluated in several SWOT analyses. The criteria by which they are divided are: political, legal and economic framework, macroeconomic performance and contribution of the IT/software industry, institutional framework supporting the software sector and performance of software industry in Macedonia.
The following table shows the results of the political, legal and economic SWOT analysis.

– Strengths-Weaknesses-Opportunities-Threats (SWOT)

Strengths

- ?? ICT companies are private new settings or private spin offs
- ?? Well developed telecommunication infrastructure
- ?? Initiatives from companies and state to develop ICT sector
- ?? Active approach from state to strengthen ICT sector (formation of KIT and e-declaration)
- ?? Regulatory changes in the telecommunications and financial sector to initiate growth of the usage of IT
- ?? Availability of inexpensive investment funds through various SME development loans
- ?? Projects that promote competitiveness, especially of the IT sector
- ?? Annual promotion support programs through the Ministry of the Economy
- ?? Promotion of e-government projects could eventually trigger demand

Weaknesses

- ?? General difficult economic situation in Macedonia, weakened by conflicts in the region
- ?? Limited capacity of the home market
- ?? Weak demand from the Macedonian economy – in particular with regard to innovative ICT products and services
- ?? Still no real free market for public procurement through political decisions
- ?? Customers still have different old systems
- ?? Companies are not aware and do not demand complex systems (ERP)
- ?? Weak demand for ICT products and services by private individuals because of high unemployment and lack of purchasing power
- ?? Weak ICT equipment with private clients
- ?? Large use of software pirated copies, even in state institutions
- ?? Limited growth possibilities for companies through many, small home orders
- ?? Migration of well educated ICT graduates because of weak home demand
- ?? Weak supply of IT specialists on the market (not enough produced by the academic institutions) and a lack of supply of middle level specialization for software developers
- ?? Tradition of services and outsourcing is underdeveloped
- ?? Government projects are mostly hardware and not software
- ?? High price competition among suppliers of software
- ?? Few foreign investments as an impulse for home ICT industry
- ?? Difficult access to credits with favourable conditions for growth financing
- ?? Lack of data about the ICT sector
- ?? Fragmented market
- ?? Lack of awareness about the Macedonian ICT know-how in the world

Opportunities

- ?? Involvement in EU projects gives chance for introduction in international cooperation
- ?? Orientation towards foreign markets can enable sustainable growth in the ICT field
- ?? Macedonia is on the margins of the EU and EU countries could work with it because of non-market criteria
- ?? Decline in demand software development specialists abroad; more could stay in Macedonia

Threats

- ?? Further potential damages to Macedonia's image through conflicts in the country or in the region
- ?? Higher migration of ICT graduates
- ?? Juridical basis to protect software products remains mostly ineffective
- ?? Offers for growth financing are not adequately developed
- ?? Lack of transparency in allocation of public purchase orders
- ?? Low IT investments from state (3 million Euros in the budget allocated to IT for 2003)
- ?? Decline in the growth trends of the worldwide ICT industry
- ?? WTO- open market; international companies entering the market
- ?? China and Russia, a large, cheap and well educated base of professionals that is still not taped
- ?? International companies coming to Macedonia implementing software used by their mother companies

The following table shows the results from the SWOT analysis about the Institutional framework supporting the software sector:

Strength	*Weaknesses*
?? Good education of IT specialists ?? University for ICT and corresponding chairs belong to international networks ?? Subvention programs from international organizations ?? Increased awareness about credit card usage through the Visa Electron, Mastercard and Maestro credit cards offered to students ?? International certifications of IT specialists ?? MASIT association ?? New private and NGO/governmentally funded IT education programs that would generate more ICT specialists and decrease labour costs	?? Lack of cooperation between the private sector and educational institutions ?? There is not a Macedonian publication that deals with IT issues
Opportunities	*Threats*
?? Consolidation of efforts through MASIT ?? Set up of regional networks ?? Free trade agreements with 10 countries in the region and with EFTA and EU ?? WTO ?? Association MASIT strengthens its position as representative of interests towards government and other sectors. ?? MASIT is also orientated towards the most important task: the support of the Macedonian ICT industry for internationalisation	

The following table shows the SWOT analysis in regards to the performance of the software industry in Macedonia

Strengths	Weaknesses
?? ICT companies with a wide range of offers ?? Particularities of the Macedonian markets (heterogeneous ICT infrastructure of customers) protect in a short term the ICT sector from international competitors ?? Strong rivalry for standard products and simple services promotes competitiveness ?? Combination of hardware and software skills ?? High quality products in some fields ?? Customer oriented behaviour ?? Relations with the regional markets ?? Rapid growth in the ICT sector experienced in 2000 and 2002 provides more opportunities for investment and further growth of the companies	?? Most of ICT suppliers orientate to current needs of home customers (does not trigger innovation) ?? Lack of ICT experts with specific technical knowledge ?? Weak specialization of companies ?? ICT companies are too oriented towards sales of both hardware and software ?? Cooperation culture between companies is not sufficiently developed ?? Potential for work sharing in the region is not extensively used ?? Company size and resources of many ICT companies are too weak for international expansion or cooperation ?? Marketing strategies are not planned for the long-term ?? Lack of project management skills and/or industrial production of software
Opportunities	Threats
?? Partnerships with significant foreign companies can subsequently support the „professionalization“ of ICT companies ?? Opportunities in specialized application software and qualified services due to a weak competition ?? Fast extension of offers for innovation-supporting services ?? Using students as interns; fill in demand for software developers and practical experience for students before they begin with work ?? Strategic alliances with foreign companies to increase exports ?? Internet and software development	?? Dependency on scientific-technical development through orientation to the home market ?? Orientation to the sales of „Western“ products and corresponding services reduces skills of own creative development

Macedonia's IT industry strengths could be bestowed to the following factors:

- 10-20% annual growth of the IT market
- Upward trend in the Internet usage and Internet services forecasted to consist 25% of the Macedonian IT market by the end of 2002
- 64% of PCs and 47% of servers sold are assembled in Macedonia
- Favorable regulations for Internet Service Providers (ISP)
- Skilled and educated force

On the basis of the conversations that were held with several software development companies on how they characterize the Macedonian IT sector, following are some exerts that could give a better picture of the status in the software sector of the Macedonian IT industry:

- Until recently there was no government institution that would present the interests, and this was viewed as a large handicap. Now there is the KIT, which is very much welcomed by the sector and the expectations from its work are very high
- Lack of knowledge about IT by the management of Macedonian companies and therefore it makes for a difficult sale (a lot of the companies think that IT is a luxurious investment). Most of the companies do not have IT strategy in place.
- The market is not small in size but in the financial potential (Slovenia with a smaller number of population has 10-20 time more software development companies than Macedonia).
- Lack of production of value added products; the market depends a lot on imported products and their resale.
- MASIT is perceived as the driver for building relationships based on trust and cooperation among the companies
- Lack of partnerships among competing companies to bid for large projects
- Fluctuating markets; therefore it is very difficult to plan on staff needed.
- Some estimates are that 20% of the market is a grey economy; a lot of the goods that are imported for re-export are sold domestically.
- There are no quality standards established yet
- A lot of the companies expressed their dissatisfaction with the law for public procurement (not transparent).
- Except for the international/donor institutions, the other organizations do not have yearly work plans and it is very difficult for the IT companies to plan their needs for the year.
- Most of the companies see export possible only through some type of partnership or cooperation with a foreign partner; they do not believe that they could do it on their own; the reason for this opinion is that companies from Macedonia are not well established and are not known in the foreign markets (do not have a brand name).

2.4.1.2. Porter's Analysis

Based on the data provided in the text above, we could analyze the Macedonian IT sector domestically and its profit potential. In order to analyze the industry domestically we will use Porter's 5 Forces analysis:

- Industry competitors- Rivalry among existing firms: - Even though the market for IT software in Macedonia is very fragmented, most of the companies cover several segments. This is due to the limited market and the fact the companies could not afford to specialize in only one area of development. As a result, most of the largest players on the market compete directly, for a limited number of projects and often they engage into price wars. Another factor we could look at to determine the level of industry rivalry is the number of companies. Generally, when the number of competitors in an industry is large, all else equal, we expect more competition in the industry. The Macedonian market is characterized by a large number of smaller companies (in terms of the size of the market). The second criteria we look at, is the size distribution of the market participants. In general, in industries in which the major firms are all similarly sized, rivalry is more intense. In Macedonia, the size of most of the industry players is around 20-40 employees. Also, the changing conditions of demand and supply have an

effect on the rivalry of the industry. Variability in demand creates more rivalry within an industry, and this is the case with the Macedonian IT industry. Asset specificity is another factor that we need to look at to be able to arrive at a decision about the competition of the industry. Asset specificity could be a specific asset, tangible or intangible, that is only used in that industry and could not be transferred to another industry. Industries that have substantial specific assets exhibit high barriers to exit and intensified competition. Generally, except for a brand name, the software industry is not viewed as having asset specificity. In addition, the software development companies in Macedonia are viewed to be quite homogeneous (similar in the products they sell and their management approach). The more similar are firms in the market, all else equal, the easier will be coordination of those firms. Therefore it could be concluded that the level of rivalry in the industry is medium/high. Intense rivalry among firms in an industry reduces average profitability and makes it unattractive.

- Presence of substitute products - this refers to competition from related markets. A substitute is a product that satisfies the same customer need. Substitutes for software are very rare and they could be some electronics (process control systems) or simple, man-done operations. It could be concluded that there are no real substitutes for software.
- Buyer power - All firms need to pay attention to what their customers want. Nevertheless, there are considerable differences across markets in how powerful buyers are and in how able they are to force down prices or influence product quality levels. The first factor to look at in determining buyer power is the number of buyers and the distribution of their purchases. The larger the number of buyers and the smaller their individual purchases, the less power each one will have. The power of the buyers of the Macedonian IT companies is high, since there are not many buyers on the market and every software company is bidding for the same clients. Secondly, there are some characteristics of the product itself. Standardizations of the products increases buyer power since it typically reduces switching costs of those buyers and allows them to more easily play one supplier against the second. The software industry in Macedonia offers customized products and therefore this reduces the power of the buyers. Third, when buyers can integrate backwards, producing the good for themselves, this also increases the bargaining power. Few of the companies have internal IT capabilities to produce the software for themselves; therefore this lessens their power. In conclusion, the power of the buyers is medium.
- Power of suppliers – In the same way that powerful buyers can squeeze profits by putting downward pressure on prices, suppliers can squeeze profits profits by increasing input costs. The only supplier to the software industry is the labor. Since there is a deficit of software developers, they have power over the industry. Since the products are not standardizes, this increases their power as well. Therefore it could be concluded that the power of suppliers for the software development industry is high. This could be noticed from the interviews with the companies where they stated as one of their biggest problems the retention rate of the software specialists after the long period it takes to train them.
- Threat of new entrants – There are several factors that will influence whether new companies enter the market: specific assets, economies of scale, excess capacity, and reputation effect. As stated above, there are no specific assets needed for entering the industry; there are not economies of scale needed, since the unit costs do not decrease with the organization increasing the scale of operations; there is excess capacity in the industry and few companies have

already developed brand name. Therefore it could be concluded that threat of new entrants is medium.

A careful analysis of industry structure is clearly important as a way of understanding profit potential. However, this analysis is based on the domestic market conditions. In other markets, we need to look at what is going in worldwide in order to fully understand operations within any one country. These latter markets are known as global markets. A global market is one in which the economics of operating in a particular market depend not only on what the firm is doing in that market, but on its activities worldwide. The IT software market is a global market. In determining how certain industries have pertained to certain locations, Porter uses the Diamond model. We could use this model to analyze whether Macedonia satisfies the conditions to become a location attractive for the development of the IT industry and what needs to be done in order to develop it as such. The first factor begins where all classical trade theory begins, with the match between factor endowments of the country and the needs of the industry. Industries thrive in countries which are either naturally endowed in the factors of production needed by the industry or are easily able to obtain elsewhere. Macedonia has a well-educated work force, even though in short supply. The strongest and most enduring competitive advantage for nations is created by those factors that have the least mobility. Unfortunately, a competent work force is a mobile factor that has been proven by the constant migration of IT specialists. Porter, in his discussion of the role of demand in the location of industry, focuses more heavily on the composition of demand. He argues, "…a product's fundamental or core design nearly always reflects home market needs…". Unfortunately, the unsophisticated demand in Macedonia does not contribute much to this element. The third element is the presence of related and supporting industries. There is a developed market for hardware, but it consists mostly of imports. The fourth element is the firm strategy, structure, and rivalry in the home industry. There are powerful effects that domestic competition has on the ability to compete in the global marketplace. This is a positive factor that comes from the high level of competition on the domestic market. The final determinant of location is government. There is a powerful role that governments sometimes play in inhibiting globalization while trying to encourage and protect domestic industry. But governments also play a positive role in encouraging the development of industries within their own borders that will assume global positions. Government could affect infrastructure, education, and other public goods. The Macedonian government has not been doing enough to support the development of the IT sector, but if it decides that it is a priority, there are several things that could be done to improve the competitiveness of the sector.

In summary, Macedonia's IT technicians have proved to be skilled and competent to produce quality software. A large number of these technicians upon receiving their education in Macedonia leave for abroad, but some return to Macedonia with valuable experience. The problem of immigration of IT professionals has both negative and positive sides; negative being that there is not a sufficient supply of IT professionals on the market and the positive being that they could become potential business partners and promoters of Macedonian software, as has been the case in some instances. Since software development involves a lot of developmental costs, the IT companies need to focus more on the fact that they need to find multiple buyers for their products. This could not be done through custom-made software; companies need to think more in terms of developing standardized products with the possibility of customization for the needs of individuals companies, but with the main use of the product for wider range of companies. The IT companies could achieve this if they start developing products that

could have prospect for success, act proactively in their developmental activities, invest in product development and expand their selling activities. This involves selling techniques that incorporate project management capabilities that Macedonian companies lack. This approach is needed if the companies want to develop their own products and act as real application software developers. This approach is driven by innovation and product development and where value is created. Another way for the individual companies to proceed is to become outsourced help for large foreign companies in their product development. In this case, they act as hired "labor" for other IT companies. There is not any additional value created by the company that provides the outsourcing company, but this could provide stable revenue generation and the open areas for R&D activities on the side. Whichever approach the companies chose to take will be driven by the competitive competencies of the companies on the market; i.e. are Macedonian IT companies going to compete on cheap labor, innovative solutions, niche market segments, or customized software? Also, one of the major issues that the companies need to resolve in the competitive segment is what's their field of specialization. They could not be everything to everybody. These are decisions that need to be looked at in the strategy definition part of the paper.

This leads us to another critical part of the strategic analysis of the sector and that is the definition of a competitive advantage. A competitive advantage is a number of characteristics of an organization or a national industry that allow it to outperform rivals in the same industry.

A lot of the companies when asked what is the competitive advantage of Macedonian IT industry either did not know it or could not say what that might be. On a second though they could list some factors:

- With countries such as India, they view the competitive advantage as India not having project management, being too far, no knowledge of the markets, and do not offer custom solutions. This is where some MK companies see their competitive advantage.
- MK advantage could not be in systems software, but in application software
- Macedonia could compete with price on the EU markets with custom made solutions (If it costs $50,000 in EU market, in the MK market it costs 2,000-3,000$)
- Well educated workforce that has proved its quality abroad

Coupling these advantages with some of the strengths mentioned in the SWOT analysis gives a real potential for the development of the software development sub-sector as a part of the overall IT sector. The negative segments of the Porter's 5 forces and the Diamond analysis should not be looked at as limitations but rather as opportunities for development. Also, this is where we have to look for the answers and recommendations for the development of the software development sub-sector.

3. Conclusion

Even though the market in Macedonia is very small there is still a potential for growth and further penetration of the IT solutions on the market. This could be seen from the relatively high growth rates. Therefore there is still a potential for growth in the domestic market and the IT companies should not overlook this. Respectively, except for few companies that have made successful penetrations in the foreign markets, the rest of the IT companies should put more emphasis on the development of this aspect of their business. They should research the successful business models of their fellow country colleagues and see whether they could use similar approaches.

The formation of MASIT is definitively positive in the respect that this association gives the companies leverage in their requests to the government. Also, this is a venue for their joint effort to improve the overall environment in which they work as well as put their profession as a priority for the government.

The government needs to increase its support for the IT sector and start incorporating IT aspects in its everyday work. The government has been very loud in its support of the sector but it has not taken any serious actions up to date. The role of the government should be to ease the legislation that supports the development of the sector, develop programs to increase and stimulate the development of increased demand for IT services, and develop strategic alliances to assist the sector. Since the largest demand drivers for the use of software are PC penetration and Internet penetration, the government could influence the development of the sector indirectly through increasing the above mentioned.